Find The Measure Of The Smaller Angle Formed By The Hands Of A Clock At The Following Time.1:25

Find The Measure Of The Smaller Angle Formed By The Hands Of A Clock At The Following Time. 1:25 has intrigued many students and enthusiasts trying to understand how to calculate angles between clock hands accurately. The problem involves understanding the movement of the hour and minute hands and applying basic mathematical principles to determine the smaller angle between them at a specific time. This article aims to guide you through the process step-by-step, providing clarity, formulas, and tips to solve such problems with confidence.

Understanding the Basics of Clock Angles

Before diving into the specific problem at 1:25, it's essential to understand how clock hands move and how to measure angles between them.

The Hour Hand

- The hour hand completes a full rotation (360°) in 12 hours.
- Therefore, the hour hand moves at a rate of 360° / 12 hours = 30° per hour.
- Additionally, it advances as minutes pass. In one minute, the hour hand moves 0.5° (since 30° per hour divided by 60 minutes).

The Minute Hand

- The minute hand completes a full rotation (360°) in 60 minutes.
- It moves at a rate of 6° per minute (360° / 60 minutes).

Calculating the Angle Between Hands

- To find the angle between the two hands at a given time, you need:
1. The position of the hour hand.
2. The position of the minute hand.
- The difference between these two positions gives the angle between the hands.
- Since there are two angles between the two hands (the larger and the smaller), always consider the smaller one for typical problems.

Step-by-Step Calculation at 1:25

Let's apply these principles to the specific time: 1:25.

Step 1: Determine the position of the minute hand

- At 25 minutes past the hour, the minute hand is at:
- 25 minutes × 6° per minute = 150°
- This means the minute hand is 150° from the 12 o'clock position, moving clockwise.

Step 2: Determine the position of the hour hand

- At 1:00, the hour hand is exactly at 30° (since 1 hour × 30° per hour).

- As minutes pass, the hour hand moves further:

- In 25 minutes, it moves:

25 minutes × 0.5° per minute = 12.5°

- Therefore, at 1:25, the hour hand is at:

- 30° + 12.5° = 42.5°

Step 3: Calculate the difference between the two hands

- The absolute difference:

- |150° - 42.5°| = 107.5°

- Since 107.5° is less than 180°, it is the measure of the smaller angle between the hands.

Final Answer: The Smaller Angle at 1:25

- The measure of the smaller angle formed by the clock hands at 1:25 is 107.5°.

Additional Methods for Finding Clock Angles

While the above step-by-step method is straightforward, understanding alternative approaches and formulas can be very useful.

Formula-Based Approach

- General formula for the angle between clock hands at time H:M:

$$
\text{Angle} = \min \left(|30H - 5.5M|, 360 - |30H - 5.5M| \right)
$$

\]

where:

- H = hour (in 12-hour format)

- M = minutes

- For 1:25:

\[
\text{Angle} = \min \left(|30 \times 1 - 5.5 \times 25|, 360 - |30 \times 1 - 5.5 \times 25| \right)
\]

Calculating:

\[
|30 - 137.5| = 107.5
\]

and

\[
360 - 107.5 = 252.5
\]

The smaller of the two is 107.5°.

Note: This formula simplifies calculations, especially for times not on the hour or minute marks.

Common Errors and Tips

Understanding common pitfalls can help you avoid mistakes:

- **Confusing the positions:** Remember that the hour hand moves gradually, not just at each hour mark.
- **Always check for the smaller angle:** The larger angle is simply 360° minus the smaller one.
- **Use absolute values:** The difference between positions should always be taken as an absolute value.
- **Convert minutes to decimal or degrees accurately:** Be precise when calculating the movement of the hour hand due to passing minutes.

Practice Problems for Mastery

To solidify your understanding, try solving these problems:

1. Find the smaller angle between the clock hands at 3:15.
2. Calculate the smaller angle at 6:30.
3. Determine the smaller angle at 9:45.

4. What is the smaller angle at 12:00?

Solutions involve applying the same principles: find the positions of the hands and then calculate the difference.

Conclusion

Calculating the smaller angle between clock hands at any given time combines understanding the movement of the hour and minute hands with straightforward arithmetic. At 1:25, the smaller angle is 107.5°, derived by calculating the position of each hand and finding their difference. Mastery of this concept enhances problem-solving skills related to time and angles, which are often encountered in math competitions, exams, and real-world applications. With practice and familiarity with the formulas and methods discussed, you can quickly and accurately determine the angles at any time of day.

Remember: The key to solving clock angle problems is to break down the problem into manageable steps, use precise calculations, and verify that your answer makes sense within the context of a clock's 360° cycle.

Frequently Asked Questions

What is the measure of the smaller angle formed by the clock hands

at 1:25?

The smaller angle is 70 degrees.

How do you calculate the angle between the hour and minute hands at 1:25?

First, find the positions: the hour hand at 1:25 is at 37.5 degrees (since each hour is 30 degrees plus 0.5 degrees per minute), and the minute hand at 25 minutes is at 150 degrees. The difference is 112.5 degrees, so the smaller angle is 112.5 degrees.

Why is the smaller angle between clock hands at 1:25 equal to 70 degrees?

Because the initial calculation gives 112.5 degrees, the smaller angle is the complement to 360 degrees, which is 360 - 112.5 = 247.5 degrees. Since the smaller angle is less than 180 degrees, we take 112.5 degrees if it's less than 180, but in this case, the correct smaller angle is 70 degrees due to precise calculation considering the positions.

At 1:25, what is the position of the hour hand in degrees from 12 o'clock?

The hour hand is at 37.5 degrees from 12 o'clock.

How does the minute hand's position at 25 minutes affect the angle calculation?

The minute hand at 25 minutes is at 150 degrees from 12 o'clock, which helps determine the difference between the two hands' positions and calculate the smaller angle.

What is the general formula to find the smaller angle between clock hands at any given time?

The smaller angle = min(|30H - 5.5M|, 360 - |30H - 5.5M|), where H is the hour and M is the minutes.

Is the smaller angle between clock hands at 1:25 more or less than 90 degrees?

It is less than 90 degrees; specifically, it is 70 degrees.

Additional Resources

Find The Measure Of The Smaller Angle Formed By The Hands Of A Clock At 1:25 is a classic problem in time-related geometry that combines understanding of clock mechanics with basic principles of angles and measurement. Whether you're a student preparing for exams, a teacher seeking a clear explanation, or a math enthusiast exploring the intricacies of clock angles, this guide will walk you through the process step-by-step. We'll explore the fundamental concepts, detailed calculations, and common pitfalls to help you confidently determine the smaller angle between the hour and minute hands at any given time, with a specific focus on 1:25.

Understanding the Problem: Clock Angles and Their Significance

Before jumping into calculations, it's important to understand what it means to find the smaller angle between the clock's hands at a specific time. Clocks have two primary hands: the hour hand and the minute hand. At any given moment, these hands form two angles:

- The smaller angle (less than 180°), which is usually what we seek in typical problems.
- The larger angle (greater than 180°), which is supplementary to the smaller angle (i.e., 360° minus

the smaller angle).

The goal is to compute the measure of this smaller angle at 1:25.

Fundamental Concepts and Formulas

1. Movement of the Minute Hand

- The minute hand completes a full rotation (360°) in 60 minutes.
- Therefore, its rate of movement is:

6° per minute (since 360° / 60 minutes = 6° per minute)

- Position of the minute hand at 25 minutes past the hour:

Minute hand angle (from 12 o'clock):

`Minute angle = 25 × 6° = 150°`

2. Movement of the Hour Hand

- The hour hand completes a full rotation (360°) in 12 hours.
- Its rate of movement is:

0.5° per minute (since 360° / (12 hours × 60 minutes) = 0.5° per minute)

- Position of the hour hand at 1:25:

- At exactly 1:00, the hour hand is at:

`1 hour × 30° = 30°` (since each hour mark corresponds to 30°)

- From 1:00 to 1:25, the hour hand moves:

`25 minutes × 0.5° = 12.5°`

- Total angle of the hour hand from 12 o'clock:

`30° + 12.5° = 42.5°`

Step-by-Step Calculation

Step 1: Calculate the angles of the hands

- Minute hand at 1:25:

`150°`

- Hour hand at 1:25:

`42.5°`

Step 2: Determine the angle between the two hands

- Difference between the positions:

`|150° - 42.5°| = 107.5°`

Step 3: Find the smaller angle

- Since the difference is 107.5°, and less than 180°, this is the smaller angle between the hands.

Final Answer:

The measure of the smaller angle formed by the hands of a clock at 1:25 is 107.5°.

Additional Insights and Common Variations

How to handle different times?

The process remains similar for any time:

1. Calculate the minute hand angle: `Minutes × 6°`.
2. Calculate the hour hand angle: `(Hours × 30°) + (Minutes × 0.5°)`.
3. Find the absolute difference.
4. If the difference exceeds 180°, subtract it from 360° to find the smaller angle.

Example: Find the smaller angle at 3:50

- Minute hand: `50 × 6° = 300°`
- Hour hand: `(3 × 30°) + (50 × 0.5°) = 90° + 25° = 115°`
- Difference: `|300° - 115°| = 185°`
- Since 185° > 180°, subtract from 360°:

`360° - 185° = 175°`

- Smaller angle at 3:50 is 175°.

Common Pitfalls and Tips

- Misinterpreting the angles: Remember that the angles are measured from 12 o'clock clockwise.
- For times where the difference exceeds 180°, always subtract from 360° to find the smaller angle.
- Be cautious with minutes and hours conversions, especially when dealing with times that are not on the hour.

Summary

- The key to solving clock angle problems is understanding the movement of the clock hands and translating the time into angles.
- For 1:25, the calculation is straightforward:

- Minute hand: 150°
- Hour hand: 42.5°
- Difference: 107.5°, which is the smaller angle.

- This methodology can be applied universally for any given time, making it a valuable problem-solving skill.

Final Thoughts

Finding the measure of the smaller angle between clock hands is an elegant blend of geometry and time-telling. It reinforces understanding of angles, rates of change, and basic mathematical reasoning. With practice, you can quickly determine these angles for any time, enhancing your problem-solving toolkit and deepening your appreciation for the mathematical structure behind everyday objects like clocks.

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